Running head-POST GRADUATE DIPLOMA IN PUBLIC HEALTH

PUBLIC HEALTH MODULE THREE ASSIGNMENT

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Module three questions

1. **(a) Define a chronic disease with the help of two common examples.**

Chronic disease is defined as a disease or a condition which persist and last for three months or longer *(****The US National Center for Health Statistics).*** The common examples of chronic diseases include; heart diseases like stroke, high blood pressure and secondly cancer among others where are the leading causes of hospitalization, long term disability, reduced quality of life and death sometime. In fact such persistent conditions are among the most prevalent and costly health condition in the world and the global leading causes of death and disability.

Chronic diseases with its associated conditions are the responsible for the death of more than two-thirds of the Americans according to the Centers for Disease Control and Prevention. And the prevalence of these diseases has increased rapidly among all the ages in recent years for example in 2005,the number of American with at least one chronic disease was 125 million compared to133 million people which are currently living with chronic diseases. . The picture is like to be worse by 2020 where experts estimate that 157 million people living in the United State of America will be greatly affected with chronic diseases. This will greatly have negative impacts on the economic development because it will reduce the productivity because an infected person will not be able to perform well in the field hence leading to loss of job due to high absenteeism and poor performance.

The seven most common chronic diseases including the one which are discussed above such as hypertension, cancer, stroke heart disease, respiratory conditions, mental disorder and diabetes cost the U.S economy nearly $1.3 trillion yearly including $277 billion for treating chronic conditions and $1 trillion in lost productivity according to the Study carried out by the *Milken Institute, a nonpartisan think tank.* The study also found out that minimal changes in unhealthy practices could prevent or delay chronic conditions and reduce these costs.

1. **What are the characteristics of chronic diseases?**

The Australian Institute for Health and Welfare includes the following as common features of chronic disease;

* Complex causality, with multiple factors leading to their onset
* A long development period, for which there may be no symptoms
* A prolonged course of illness, perhaps leading to other health complications
* Associated functional impairment or disability
* Non-contagious origin (non-communicable)
* Incurability
* Insidious onset

**(C) How are they managed?**

* Chronic diseases are managed by changing one’s life style for example eating healthy food i.e. a balanced diet of fruits, vegetables, whole grains, lean meats, and low-fat dairy products can helps to prevent, delay, and manage heart disease, type 2 diabetes and other chronic diseases.
* Regular physical exercise is also one of the essential ways of managing chronic diseases such as brisk walking or gardening, jogging and bike riding among others can also help in management of chronic diseases.
* They can also be managed by voiding taking too much alcohol and stop smoking because excessive drinking and smoking can lead to high blood pressure, various cancers, heart disease, stroke, and liver disease.
* Regular check up to prevent them or contracting them early, regularly visit to one’s person doctor for preventive services.
* Get enough sleep at least 7 hours daily because insufficient sleep has been linked to the development and poor management of diabetes, heart disease, obesity, and depression.
* Researchers have found out that practicing healthy behaviours in work place, schools and the community daily can prevent conditions such as high blood pressure or obesity, which may raise high risk of developing the most common and serious chronic diseases.

**2 (a) Discuss the various infectious agents**

Aninfectious agent is any organism or substance that can cause infection to humans, animals and plants. They are grouped into five major types but another agent named prions was discovered lately making total of six infectious agents or pathogens. They include; bacteria, viruses, fungi, protozoa, and helminthes. These agents differ from one another one the mode of reproduction and their appearance as discussed below;

**Bacteria**

Bacteria are unicellular prokaryotic organisms; meaning that bacteria have no organized internal membranous structures such as nuclei, mitochondria, or lysosomes. Their genomes are circular, double-stranded DNA that is associated with much less protein than eukaryotic genomes and most of them reproduce by dividing into two cells in a process known as binary fission.

The vast majority of bacteria, which can range between 0.15 to 700 μM in length, are harmless or beneficial to humans. However, a relatively small list of pathogenic bacteria can cause infectious diseases.

Pathogenic bacteria have several ways that they can cause disease that is by either directly affecting the cells of their host, produce endotoxins that damage the cells of their host, or cause a strong enough immune response that the host cells are damaged.

This diversity brought confusion in identifying the type of bacteria which is responsible for the cause of a particular disease in late 19 century until the German physician by the name Robert Koch developed methods/techniques to group bacteria by their shape and propensity to be stained by various dyes. Since most of them are harmless to humans, they live in various parts of the body without causing harm such as the skin, throat, mouth, nose, large intestine, and vagina.

It was proven by Koch that specific infectious agent could cause a specific disease by developing a set of rules that could be used to identify each type of bacteria for example; i) the organism must be present in every case of the disease; ii) the organism must be isolated and grown in the laboratory; iii) when injected with the laboratory-grown culture, susceptible test animals must develop the disease; and iv) the organism must be isolated from the newly infected animals and the process repeated.

He applied these rules to proof that ***tuberculosis*** is cause by ***Bacilli*** type of bacteria called ***tubercle bacilli or Mycobacterium tuberculosis*** which was then the leading cause of death in Europe at that time. And also one of the bacterial diseases with the highest disease burden which killed 1.5 million people in 2013, mostly in sub-Saharan Africa.

Koch continued applying his rules and later identified other bacilli bacteria which are responsible for the cause of diseases such as; cholera cause by Vibrio cholera, plague, typhoid, tetanus, diphtheria, and dysentery.

Other types of bacteria are the ***round-shaped*** bacteria also known as cocci. They include ***staphylococci***, which cause wound infections; and. Syphilis is caused by a corkscrew-shaped bacterium called a spirochete.

Round-shaped contribute to other globally significant diseases, such as pneumonia, strep throat and scarlet fever which can are caused by bacteria type known as ***Streptococcus***; and Pseudomonas, and foodborne illnesses, which can be caused by bacteria such as Shigella, Campylobacter, and Salmonella and leprosy

All these bacteria were identified by the beginning of the 20th century

**Viruses**

Viruses are small particles, typically between 20 and 300 nanometers in length containing RNA or DNA. Viruses require a host cell to replicate. Viruses, however, are not organisms themselves because, apart from a host cell, they have no metabolism and cannot reproduce. A virus particle is composed of a viral genome of nucleic acid that is surrounded by a protein coat called a capsid. In addition, many viruses that infect animals are surrounded by an outer lipid envelope, which they acquire from the host cell membrane as they leave the cell

In the general process of infection and replication by a DNA virus, a viral particle first attaches to a specific host cell via protein receptors on its outer envelope. The viral genome is then inserted into the host cell, where it uses host cell enzymes to replicate its DNA, transcribe the DNA to make messenger RNA, and translate the messenger RNA into viral proteins. The replicated DNA and viral proteins are then assembled into complete viral particles, and the new viruses are released from the host cell. In some cases, virus-derived enzymes destroy the host cell membranes, killing the cell and releasing the new virus particles. In other cases, new virus particles exit the cell by a budding process, weakening but not destroying the cell.

In the case of some RNA viruses, the genetic material can be used directly as messenger RNA to produce viral proteins, including a special viral RNA polymerase that copies the RNA template to produce the genetic material for new viral particles. Other RNA viruses, called retroviruses, use a unique enzyme called reverse transcriptase to copy the RNA genome into DNA. This DNA then integrates itself into the host cell genome. These viruses frequently exhibit long latent periods in which their genomes are faithfully copied and distributed to progeny cells each time the cell divides. The human immunodeficiency virus (HIV), which causes AIDS, is a familiar example of a retrovirus which affected 37.9 million people across the world in 2018.

Just like other infectious agents, viruses cause diseases by disrupting normal cell function. They do this in a many ways. Some viruses make repressor proteins that stop the growth of the host cell's proteins hence weakening cell membranes and lysosomal membranes, leading to cell autolysis. Some viral proteins are toxic to cells, and the body's immune defenses also may kill virus-infected cells.

Viruses are classified using a variety of criteria, including shape, size, and type of genome. Among the DNA viruses include; the ***herpes viruses*** that cause chicken pox, cold sores, and painful genital lesions, and the ***poxvirus*** that causes smallpox. Other types of viruses are those which cause human disease such as ***rhinoviruses*** that cause most common colds, ***myxoviruses*** and ***paramyxoviruses*** that cause influenza, measles, and mumps; ***rotaviruses*** that cause gastroenteritis; and the ***retroviruses*** that cause AIDS and several types of cancer among others.

In conclusion, viral diseases are so deadly and if not well treated can lead to a lot of comlications such deafness, madness, limpness and finally death.

**Fungi**

Fungi are eukaryotic, heterotrophic organisms that have rigid cellulose- or chitin-based cell walls and reproduce primarily by forming spores. Most fungi are multicellular, although some, such as yeasts, are unicellular. Together with bacteria, fungi fulfill the indispensable role of decomposers in the environment. There are approximately 300 known fungi that are pathogenic to humans which causes significant diseases to both animals and plants. Examples of diseases caused by fungi are ringworm, histoplasmosis and Candida albicans, which is the most common cause of thrush/candidacies, and Cryptococcus neoformans, which can cause a severe form of meningitis. Yeasts of the Candida genus are opportunistic pathogens that may cause diseases such as vaginal yeast infections among people who are immune compromised or undergoing antibiotic therapy make difficult to check the presence of yeast as the antibiotics reduce the bacterial population which are normally present in the throat and vagina, allowing the yeast to grow unchecked.

Fungal disease or infections take less time to cure.

**Protozoa**

Protozoa are unicellular, heterotrophic eukaryotes that include the familiar amoeba, plasmodium paramecium. Because protozoa do not have cell walls, they are capable of a variety of rapid and flexible movements. A health person can be infected by protozoa through eating contaminated food or water or by the bite of an infected arthropod such as a mosquito which are responsible for the cause of diseases which are grouped as Mosquito-borne diseases, such malaria which is caused by an infected female anopheles, Dengue and Filariasis. Diarrheal disease in the United States can be caused by two common protozoan parasites, Giardia lamblia and Cryptosporidium parvum. Malaria, a tropical illness that causes 300 million to 500 million cases of disease annually, is caused by several species of the protozoan Plasmodium.

Free-living bacterivorous protozoa are increasingly implicated in the survival and transmission of bacterial pathogens. Food-borne pathogens like Campylobacter and Salmonella, important agents of enteritis often related to the consumption of contaminated chicken meat, may survive, multiply, and be transported in the environment through association with various protozoan organisms. Interactions with free-living protozoa have been implicated in the persistence of pathogenic bacteria on food products such as alfalfa, beetroot, cress, green pea, leek, mung bean, red cabbage and rosabi. While the vegetable sprouts harbor Tetrahymena, Bodo saltans (bacterivore), Cercomonas (flagellates), Acanthamoeba and Vannella (amoebae), beetroot harbored the most abundant and diverse free-living protozoa communities, with many unique species such as Korotnevella (scale-bearing thermotolerant bacterivorous amoebae), Vannella, Chilodonella (fish parasite), Podophry. and Sphaerophrya species.

**Helminthes**

Helminthes are simple, invertebrate animals, some of which are infectious parasites. They are multicellular and have differentiated tissues. Because they are animals, their physiology is similar in some ways to ours. This makes parasitic helminth infections difficult to treat because drugs that kill helminths are frequently very toxic to human cells.

Many helminths have complex reproductive cycles that include multiple stages, many or all of which require a host. Schistosoma, a flatworm, causes the mild disease swimmer's itching in the United States; another species of Schistosoma causes the much more serious disease, schistosomiasis, which is endemic in Africa and Latin America. Schistosome eggs hatch in freshwater, and the resulting larvae infect snails. When the snails shed these larvae, the larvae attach to and penetrate human skin. They feed, grow, and mate in the human bloodstream; the damage to human tissues caused by the accumulating schistosome eggs with their sharp spines results in disease symptoms including diarrhea and abdominal pain. Liver and spleen involvement are common. Another disease due to a helminth is trichinosis, caused by the roundworm Trichinella spiralis. This infectious agent is typically ingested in improperly cooked pork from infected pigs. Early disease symptoms include vomiting, diarrhea, and fever; later symptoms include intense muscle pain because the larvae grow and mature in those tissues. Fatal cases often show congestive heart failure and respiratory paralysis.

**Prions**

Prions are mis-folded proteins that can transfer their misfolded state to other normally folded proteins of the same type. They do not contain any DNA or RNA and cannot replicate other than to convert already existing normal proteins to the misfolded state. These abnormally folded proteins are found characteristically in some diseases such as scrapie, bovine spongiform encephalopathy (mad cow disease) and Creutzfeldt–Jakob disease

**(b) Public health has had great success in controlling infectious diseases. Discuss the validity of** **this statement**

Public health has had great success in controlling infectious diseases in the following ways;

1. **Sanitation and Hygiene improvement**

In the beginning of the 19th century, rapid industrialization and immigration took this led to population increment in cities causing overcrowding in poor housing which cause shortage inadequate or nonexistent public water supplies and waste-disposal systems. These conditions resulted in repeated outbreaks of many infectious diseases which were threat to public health such as cholera, dysentery, TB, typhoid fever, influenza and yellow fever

By 1900, the incidence of many of the above mentioned diseases had begun to reduce gradually because of public health intervention, positive responses, improvements in public WASH facilities and implementation starting from local, state, and federal health departments. This efforts led to improve sanitation and hygiene and reinforced the concept of collective "public health" action e.g., to prevent infection by providing clean drinking water to all.

From 1930s to 1950s, state and local health departments made substantial progress in disease prevention activities, including sewage disposal, water treatment, food safety, organized solid waste disposal, and public education about hygienic practices (e.g., food handling and hand washing). Chlorination and other treatments of drinking water began in the early 1900s and became widespread public health practices, further decreasing the incidence of waterborne diseases. The tuberculosis infection also declined as improvements in housing by making good ventilation in every house for proper air circulation and also introduction of TB-control programs.

Animal and pest control also contributed to disease reduction. Nationally sponsored, state-coordinated vaccination and animal-control programs eliminated dog-to-dog transmission of rabies. Malaria, once endemic throughout the southeastern United States, was reduced to negligible levels by the late 1940s; regional mosquito-control programs played an important role in these efforts. Plague also diminished; the U.S. Marine Hospital Service (which later became the Public Health Service) led quarantine and ship inspection activities and rodent and vector-control operations. The last major rat-associated outbreak of plague in the United States occurred during 1924-1925 in Los Angeles. This outbreak included the last identified instance of human-to-human transmission of plague (through inhalation of infectious respiratory droplets from coughing patients) in this country.

**The introduction of vaccination**

Strategic vaccination campaigns have virtually eliminated diseases that previously were common in the world for example in United State, diseases like diphtheria, tetanus, poliomyelitis, smallpox, measles, mumps, rubella, and *Haemophilus influenzae* type b meningitis are less common. The combination of diphtheria and tetanus toxoids and pertussis vaccine in every state and local health departments instituted vaccination programs which aimed primarily at poor children in 1949.

The success of vaccination programs in the United States and Europe inspired the 20th-century concept of "disease eradication"--the idea that a selected disease could be eradicated from all human populations through global cooperation. In 1977, after a decade-long campaign involving 33 nations, smallpox was eradicated worldwide--approximately a decade after it had been eliminated from the United States and the rest of the Western Hemisphere. Polio and dracunculiasis may be eradicated by 2000.

**The use of antibiotics and other antimicrobial medicines**

Penicillin was developed into a widely available medical product that provided quick and complete treatment of previously incurable bacterial illnesses, with a wider range of targets and fewer side effects than sulfa drugs. Discovered fortuitously in 1928, penicillin was not developed for medical use until the 1940s, when it was produced in substantial quantities and used by the U.S. military to treat sick and wounded soldiers.

Antibiotics have been in civilian use for 57 years and have saved the lives of persons with streptococcal and staphylococcal infections, gonorrhea, syphilis, and other infections. Drugs also have been developed to treat viral diseases (e.g., herpes and HIV infection); fungal diseases (e.g., candidiasis and histoplasmosis); and parasitic diseases (e.g., malaria). The microbiologist Selman Waksman led much of the early research in discovering antibiotics. However, the emergence of drug resistance in many organisms is reversing some of the therapeutic miracles of the last 50 years and underscores the importance of disease prevention.

**Technologic Advances in Detecting and Monitoring Infectious Diseases**

Technologic changes that increased capacity for detecting, diagnosing, and monitoring infectious diseases included development early in the century of serologic testing and more recently the development of molecular assays based on nucleic acid and antibody probes. The use of computers and electronic forms of communication enhanced the ability to gather, analyze, and disseminate disease surveillance data.

**Molecular Techniques**

During the last quarter of the 20th century, molecular biology has provided powerful new tools to detect and characterize infectious pathogens. The use of nucleic acid hybridization and sequencing techniques has made it possible to characterize the causative agents of previously unknown diseases (e.g., hepatitis C, human ehrlichiosis, Hantavirus pulmonary syndrome, acquired immunodeficiency syndrome AIDS, and Nipah virus disease).

Molecular tools have enhanced capacity to track the transmission of new threats and find new ways to prevent and treat them. Had AIDS emerged 100 years ago, when laboratory-based diagnostic methods were in their infancy, the disease might have remained a mysterious syndrome for many decades. Moreover, the drugs used to treat HIV-infected persons and prevent perinatal transmission (e.g., replication analogs and protease inhibitors) were developed based on a modern understanding of retroviral replication at the molecular level

**(c)Discuss the ethical, legal, social, and scientific implications of using genetics and genomics in** **preventing and treating diseases**

The legal and policy paradigm in genomics - which places a high value on privacy - can conflict with the public health framework, in which individual rights can be overridden for the benefit of others. All US states have enacted genetic privacy legislation, but the scope of the protections afforded by these laws varies from state to state. The extent to which genetic privacy provisions in these statutes may conflict with state public health laws is unclear. The Model State Emergency Health Powers Act enumerates the powers that will be granted to state and local officials to protect public safety in the event of a public health emergency, and includes provisions related to mandatory vaccination and quarantine .Many states have adopted at least some of the provisions of the model legislation

Genetic tests that are not valid or useful have the potential to cause harm by prompting inappropriate changes in medical care based on incomplete or incorrect information.

Family health history is an important risk factor for common diseases, independent from traditional risk factors. More than 50% of the population is at increased risk of diabetes, cancer, or heart disease because they have close relatives with 1 or more of these diseases. Family health history has the potential to improve health by identifying people who are at risk for disease in the future or who are already sick but have not been diagnosed.

The U.S. Precision Medicine Initiative, launched in 2015, aims to promote health and treat disease by taking into account individual differences in people’s genes, environments, and lifestyles. As genomics discoveries lead to new opportunities to improve health through the use of genetic tests and family health history tools,important challenges need to be addressed.

It is becoming increasingly difficult for independent review panels to evaluate quickly and thoroughly the evidence of the proposed health benefits and harms of the fast-growing number of genetic tests and family health history tools.

As the number of recommended genetic tests increases, valid and reliable national data are needed to establish baseline measures and track progress toward targets. Many tests are recommended for use in small subpopulations, making it difficult for most national health information systems, such as the National Health Interview Survey (NHIS), to monitor progress. Traditional administrative data sources in the health care system offer new potential to track specific genetic tests in billing records with the implementation of current procedural terminology (CPT) codes for molecular genetic tests beginning in 2012.

There are lessons to be learned from the mistakes made in early attempts to screen for sickle cell disease, a disorder of hemoglobin, the oxygen-carrying protein in the blood. In this disease, painful crises of impaired blood circulation occur in individuals who have inherited two copies of the recessive gene, which was identified in the 1970s. However, well-meaning attempts to initiate screening programs for sickle-cell disease, inspired by the success of Tay-Sachs screening in Jews, caused widespread confusion and ill feeling among African Americans, the group at highest risk for carrying the sicklecell gene. The meaning of the tests was not understood, and many people who were healthy carriers of one gene were discriminated against in school and in employment and were denied health insurance. Many African Americans became suspicious that the intent of the program was genocidal.

Considerable time, effort, and money were required to overcome the early mistakes. Now, most states include sickle-cell disease in their newborn screening programs. While there is no cure for sickle-cell disease, infant and childhood mortality is reduced by prophylactic treatment with penicillin, which prevents infections associated with the crises.

Difficult questions always arise when a serious disorder is diagnosed in a fetus or the genetic potential for such a problem is recognized in the parents. Aborting a fetus with a genetic or teratogenic abnormality is often the only alternative to the birth of a child with a handicap. Many Americans are uncomfortable with, if not morally opposed to, abortion. However, attitudes vary with the severity of the abnormality: Most people would support the parents’ decision to abort a fetus with anencephaly, the absence of a brain, a condition that is rapidly and inevitably lethal.

The acceptability of a Down syndrome child varies significantly among prospective parents; some couples choose abortion, while others are happy to have the child. Matters become even more complicated when the genes being identified are those that are known to cause diseases of later life. One of the cruelest of these is Huntington’s disease, a single-gene defect in which symptoms first appear between the ages of 30 and 50. During the next 10 to 20 years, the disease progresses toward death, with symptoms that include extreme involuntary movements, intellectual deterioration, and psychiatric disturbances. Because Huntington’s disease is inherited in an autosomal dominant fashion, each child of an affected individual has a 50 percent chance of developing the disease. Although a test is now available that allows individuals to learn whether they carry the gene and are thus destined to develop the symptoms, many people who are at risk have decided they would prefer not to know. The psychological impact of such knowledge can be devastating, and the potential for being denied insurance or employment is significant. On the other hand, individuals with a family history of Huntington’s disease may wish to know whether they carry the gene before deciding whether to beget children

**4. Identify two infectious diseases and the possible treatment of each.**

**Influenza**

Influenza is a respiratory disease which is caused by virus. Its highly contagious disease which is spread when an infected person coughs or sneezes or it can be passed to a healthy person by shaking hands with an infected person. The disease is characterized with the following symptoms; i) runny or blockage nose ii) sore throat iii) iv) high fever v) headache vi) Joint and limbs pain vii) tiredness.

An infected person can be treated using antivirals such Tamiflu and flue caps. Some pain relievers like aspirin can be used to alleviate some symptoms headache and body pains. The US Food and Drug Administration approved a new drug called baloxavir marboxil (Xoflueza) which should be administered orally in a single dose if the person is age 12 and above and have had the symptoms for fewer than 48 hours.

In addition to medication; infected person can take a lot of liquid and take enough rest or sleep in a warm place.

**Ebola virus disease/** **Ebola hemorrhagic fever**

The Ebola virus disease is one of the most deadly infectious diseases which can kill the infected person within a short time. It is characterized with the following symptoms which start two days to three weeks after contracting the virus, with a fever, sore throat, muscle pain and headaches. Typically, vomiting, diarrhea and rash follow, along with decreased functioning of the liver and kidneys. At this stage, the affected people may begin to bleed both within the body and externally like from the nose, eyes. The Ebola virus may be acquired upon contact with blood or bodily fluids of an infected animal which spread through the air.

Fruit bats are believed to be responsible for carrying and spreading the virus without being affected but when human infection occurs, the disease may spread between people, as well. Male survivors may be able to transmit the disease via semen for nearly two months.

The current global air travel and traditional practices especially in West African countries has made it difficult to control the epidemics. The disease has not only caused several deaths but also caused economic stagnation in affected countries, for example the most West African countries where the pandemic has hit the most such as Liberia, Niger among others which ranked the largest Ebola outbreak in history and the first in West Africa in 2014.

Ebola has crippled public health systems especially in West Africa countries which led to the call of international bodies for serious intervention which is currently on going. The intervention which is currently led by the World Health Organization (WHO) and other domestic and international partners has activated its Emergency Operations Center to help coordinate technical assistance and control activities with partners.

The International Health Regulations of the World Health Organization has installed a mandatory system of mutual information and alertness to help fight and contain and control the disease.

**5. What are some public health responses to emerging infections in your country?**

The American public health system, criticized in 1988 for being in disarray, has taken many steps toward responding to the emerging threats of infectious diseases. While still underfunded and challenged from all sides, American public health agencies have devoted significant resources to developing plans and priorities for confronting the threats.

The Institute of Medicine has undertaken several studies to address the environmental, demographic, social, and other factors leading to the emergence or re-emergence of infectious diseases.

Most of the emerging infectious disease events have been caused by zoonotic disease pathogens—those infectious agents that are transmitted from animals to humans. Factors that contribute to the risk of this animal to human transmission include human population growth, changing patterns of human– animal contact, increased demand for animal protein, increased wealth and mobility, environmental changes, and human encroachment on farmland and previously undisturbed wildlife habitat. Clearly, these diseases are an international problem, and dealing with them requires an international response.96

Global surveillance for infectious diseases is critically important for identifying potential epidemics early enough to bring them under control. Diseases that went unnoticed in animals but have spread to humans include AIDS, Ebola, avian influenza, and SARS. Effective control of emerging infectious diseases requires worldwide disease surveillance focusing not only on human populations, but also on domestic animals and wildlife. Thus, the CDC is collaborating with, in addition to the World Health Organization, the World Organization for Animal Health, and the Food and Agricultural Organization of the United Nations. In addition, the CDC has established the International Emerging Infections Program, which has laboratories in China, Egypt, Guatemala, Kenya, and Thailand.

Other priorities that the Institute of Medicine has identified for controlling emerging infections include reducing inappropriate use of antibiotics by banning their use for growth promotion in animals and by developing improved diagnostic tests for infectious diseases so that antibiotics are not used for viral diseases. The Institute of Medicine also recommends developing new vaccines, new antimicrobial drugs, and measures aimed at vector-borne diseases

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